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Oh Broadband Where Art Thou and Other Observations on Minnesota's Telecommunications Infrastructure as We Begin the Twenty-first Century

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OH BROADBAND WHERE ART THOU AND OTHER OBSERVATIONS ON MINNESOTA'S TELECOMMUNICATIONS INFRASTRUCTURE AS WE BEGIN THE TWENTY-FIRST CENTURY

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I. INTRODUCTION

The Minnesota Legislature is once again facing the prospect of proposals and efforts to make significant changes to the laws gov-

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erning regulation of telecommunications in the state. The impetus for these most recent efforts is a combination of market forces, technological advances, revisions in federal law governing telecommunications with impact on state regulatory schemes, and inadequacy of current state laws to function in this environment. These factors combine to create an unprecedented opportunity for legislation that fosters rapid, accelerated deployment of telecommunications infrastructure necessary to secure the economic and societal benefits of the new commerce and communications mechanisms of the twenty-first century.

The recent efforts to encourage more rapid deployment of advanced telecommunications infrastructure, especially at the federal level, demonstrate the enormity of the challenge. Laws that have been in place over seventy years must be changed. Businesses with huge economic stakes contest existing and future markets at all levels, including the marketplace, Congress, the Federal Communications Commission (FCC), state legislatures, state public utilities commissions and beyond. The technology and its related jargon are often nearly incomprehensible. The laws are complex, and the interpretation and application of them even more so. The arguments on how to clean up the mess can often add to the confusion. In addition to affecting significant business interests, telecommunications reform legislation in the current environment will also impact service subscribers, who are often wary of price fluctuations and know how to vote. The real and present opportunities for significant policy leadership and economic advancement can be lost in the shuffle.

Minnesota can secure a leadership position by adopting legislation and regulation that encourages swifter deployment of broadband technology to homes and businesses throughout the state. Speeding the deployment of broadband infrastructure will secure a comparative advantage over other areas of the country in creating and attracting businesses, will complement the advancement of the state's already significant leadership in medical technology and development of "last mile" technologies, and will assure a quality communications infrastructure for all Minnesota citizens. Speeding the deployment of broadband infrastructure will provide direct benefits in the areas of health care delivery and monitoring systems, telecommuting, global market realization opportunities, distance learning, and geographic-neutral economic development.

This article explores and advocates strong Minnesota leader-

ship towards the immediate adoption of measures that will significantly advance the speed of deployment of broadband infrastructure within the state, especially to homes and rural areas. Many of today's regulatory reform proposals seek to address issues arising from a long history of regulated monopoly in telecommunications with its attendant legacy infrastructure. While the battles over the past may need to play themselves out, they ought not perpetuate deployment of sub-optimal technology, cloud what is at stake or block consideration of opportunities to immediately encourage and deploy broadband infrastructure.

II. THE WAY TO PREDICT THE FUTURE IS TO BUILD IT

The statement of Peter Drucker that "the best way to predict the future is to invent it"[1] applied to current telecommunications regulatory reform issues is both a truism and a call to action. Issues surrounding existing market participants and their existing networks lead to turbulent waters, often with no clear answers. Deployment of new broadband infrastructure has many historic parallels but is nonetheless in many ways like traveling in uncharted waters. The rising importance of first-tier telecommunications infrastructure to the well being of citizens and businesses is increasingly omnipresent.

"Telecommunications is a fundamental and increasingly important infrastructure and of the sort with which all levels of government are appropriately concerned."[2] The convergence of telephone and computing technologies presents an arena where "as the old networks obsolesce, so does the regulatory framework."[3] Business leaders throughout Minnesota repeatedly respond to the question of "What can government do?" with clear statements that the provision of quality telecommunications infrastructure in Minnesota is of top priority and essential to economic prosperity in the twenty-first century:[4] One business leader stated, "[a] changing

1. Steven P. Lindenberg, *Electric Cooperatives in a Deregulated Market*, 15 F. FOR APPLIED RES. & PUB. POL'Y 41, 44 (2000).

2. Bob Rowe, *Strategies to Promote Advanced Telecommunications Capabilities*, 52 FED. COMM. L.J. 381, 393 (2000).

3. Seth A. Cohen, *Deregulating, Defragmenting & Interconnecting: Reconsidering Commercial Telecommunications Regulation in Relation to the Rise of Internet Telephony*, 18 J.L. & COM. 133, 134 (1998).

4. CITIZENS LEAGUE, *Securing Minnesota's Economic Future—A New Agenda for a New Economy* (May 2000), *at* http://www.citizensleague.net/reports/neweconomy.htmL; MINNESOTA PUBLIC RADIO, *Minnesota in the .Com Age*, (Dec. 2, 1999),

economy demands new infrastructure investments .... 'Telecommunications networks are the 'highways' of [this] century.' To secure Minnesota's place in the global information economy, we need to invest in a world-class information infrastructure."[5]

The importance of government encouragement, incentives and leadership is especially important insofar as assuring increased deployment of broadband infrastructure to the "last mile."

Internet2 is up and running. Internet2 trunks are currently able to carry data traffic in volumes much higher than the Internet, and quadrupling the capacity of Internet2 is already being considered. The location of Internet2 Abiliene Network telecommunications core node trunks (all outside of Minnesota) and the traffic on those trunks may be viewed real-time on the Internet at http://www.abilene.iu.edu/content.cgi?page=home. In debating the numerous regulatory reform issues attendant existing voice-grade telephone service and its narrowband data capabilities, this Internet2 website shines as a bright Sputnik-like reminder that the rest of the world is not on hold.

The current telecommunications environment of deregulatory uncertainties, mega-mergers, mega-layoffs, stock price considerations and rapid technological advancements leads many vested telecommunications interests to focus on immediate profits and short-term benefits. Likewise, the global telecommunications businesses capable of speeding large infrastructure investments in Minnesota have many options for capital deployment. Without active intervention by government, the current opportunities to obtain comparative advantage over other areas of the world in telecommunications infrastructure may be lost. We may still get there someday, but when and at what cost?

The opportunity to speed broadband deployment within the state will therefore require strong leadership from government and private sector participants. As noted in Earl Bakken's *Reflections on Leadership—Leadership versus Management*, this leadership will need to be characterized by length and breadth of vision—"looking farther down the road" rather than "too tightly on the here and now."[6] Bakken states, "we ought to think of ourselves as leaders, and make no bones about the label .... Our future may well depend on our

RADIO, *Minnesota in the .Com Age*, (Dec. 2, 1999), *available at* http://www.mpr.org.

5. CITIZENS LEAGUE, *supra* note 4.

6. EARL E. BAKKEN, MEDTRONIC, REFLECTIONS ON LEADERSHIP 11-12 (1989).

response."[7]

III. THE TIME TO INCENT BROADBAND TO THE HOME IS NOW

Existing telephone networks rely primarily on twisted pair copper wire to connect to the home. Existing cable television networks rely primarily on copper coaxial cable to connect to the home. Both of these technologies require significant investment to upgrade in order to carry larger volumes of data at higher speeds.[8] Even after large investments to extract further capacity from this existing copper "last mile" infrastructure, the data capacity of either will still be far less than a single strand of fiber optic cable.[9] "A single optical fiber can easily carry more than 600 megabits/second to individual users—far beyond the capability of either DSL or cable lines. Indeed, DSL and cable modems would whet consumers' appetites by giving them a taste of bandwidth plenty that only fiber can satisfy."[10]

Absent immediate government incentives, extension of fiber optic connectivity from network backbones to homes and small businesses will be delayed ten to twenty years while telephone and cable companies attempt to squeeze additional life from lesser DSL and cable modem technologies. The irony of this currently unchecked reality is that the aggregate expenditures by telephone and cable companies to each separately upgrade their networks to DSL and cable modem capabilities likely exceeds what it would cost to install fiber optics to the home.[11] One commentator has stated,

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7. *Id.* at 12.

8. Scott Thurm, *Keeping the Customer Satisfied—The Battle to Deliver High-Speed Communications into the Living Room May Not Be Fought Over Technology*, WALL ST. J., Sept. 21, 1998, at R24; Stephanie N. Mehta, *The $1,000,000,000,000 Bet: Someone's Going to Get Rich Delivering Broadband. Someone's Going Home in Tears*, FORTUNE, Oct. 9, 2000, at 124.

9. Jeff Hecht, *Fiber Optics to the Home*, 103 TECH. REV. 48 (2000), *available at* http://www technologyreview.com/magazine/mar00/hecht.asp.

10. *Id.* at 49.

11. It has been estimated that upgrading cable systems for Internet service would cost about $800-$1000 per subscriber and from $800-$1500 per subscriber to upgrade telephone lines to allow for DSL grade service. Dean Takahashi, *The Cable Edge—Why the Phone Companies Just May Lose Out in the Long Run*, WALL ST. J., Sept. 21, 1998, at R14. Today, some fiber optic companies are successfully installing fiber optic networks to the home at a cost of $1500 per subscriber. Mehta, *supra* note 8, at 124-25. These costs are becoming lower with time, as reflected by comparing a 1996 analysis that placed the cost of copper upgrade at $3000 per customer and $5500 for fiber optics. Mark Brose, *Fiber-to-the-Home: East Otter Tail Phone Company Builds for the Future*, ¶¶ 2-3 (Oct. 26, 1996), *at* http://www.freenet.

"If the past is any guideline, moreover, demand for bandwidth will soon outstrip the capacity of these jury-rigged alternatives."[12] Another commentator elaborated, "[f]iber optics has helped push the telecommunications system into hyperdrive. But only when fiber connections reach all the way into the home will the technology's promise fully be realized."[13]

"The explosion of data communications ... and the demand for faster connections have created a multibillion-dollar market with no clear owner. This digital traffic is doubling every year"[14] and has or will surpass traditional telephone calls in volume in the very near future.[15] "The extension of broadband capability beyond its current scope to a majority of small businesses and households is an important challenge for the communications industry."[16] Thus, immediate government attention to promote broadband deployment will speed the advantages of broadband technology to the state and reduce the potential for wasteful investments in lesser legacy technologies soon to be obsolete.

The wireline "last mile" is also demanding of ongoing governmental direction because it continues to demonstrate all of the characteristics of a natural monopoly.[17] In the new data world of "a bit is a bit is a bit," the technological reason that created the existing telephone/cable duopoly of the "last mile" no longer exists. "In the area of telecommunications, the fixed costs of establishing a fixed line local network are such that a single enterprise will generally be able to provide services to all users in a given area at lower costs than would two or more enterprises, each with its own network."[18]

"What ever happened to competition for local phone service?

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msp.mn.us/people/brose/papers/FTTH.html.

12. Hecht, *supra* note 9, at 49.

13. *Id.* at 48.

14. Thurm, *supra* note 8, at R24.

15. *Id.*

16. Howard A. Shelanski, *The Speed Gap: Broadband Infrastructure and Electronic Commerce*, 14 BERKELEY TECH. L.J. 721, 722 (1999).

17. Bart Ziegler, *Out of the Loop—What Ever Happened to Competition for Local Phone Service? It's Simple Economics*, WALL ST. J., Sept. 21, 1998, at R6. As early as 1915, policymakers in Minnesota concluded the telephone system is a natural monopoly. Ventura Administration Telecommunications Strategic Plan Executive Summary, at 5 (Dec. 14, 1999), *at* http://www.admin.state.mn.us/telecomm/govtelecomm.

18. Michael Kerf & Damien Geradin, *Controlling Market Power in Telecommunications: Antitrust vs. Sector-Specific Regulation*, 14 BERKELEY TECH. L.J. 919, 923 n.1 (1999).

It's simple economics."[19] The expense of building a duplicate wireline network to homes would be enormous, in the billions of dollars assuming regulatory and other necessary approvals.[20] In a national telecommunications services market exceeding $200 billion annually, about half of the revenues are generated by local carriers and, of this amount, over ninety percent by incumbent local exchange carriers.[21] Incumbent telephone companies, therefore, acting rationally in their near-term economic self interest resist efforts to implement local competition for telephone service and requests to begin more aggressive investment in installation of fiber optic technology to the "last mile." This led the Wall Street Journal in 1998, to report:

> As a result, some say it's time for a radical solution. They say we should finally just acknowledge the obvious—that the local loop is a 'natural' monopoly—and create separate companies to own and operate these lines. The new owners of the local phone infrastructure would be encouraged to upgrade the lines and then lease them at a uniform rate to all comers ....[22]

Today, three years later, little has changed, especially as concerns the "last mile."

The time is ripe for recognizing the need and implementing a future-looking Minnesota strategy for deployment of broadband capacity to homes and rural areas. Internet technology is burgeoning but actually only in its infancy.[23] Business leaders have recognized the demands of the new economy and are calling for significant advancement of Minnesota's telecommunications infrastructure. As far as e-commerce, "the real question is not whether there will be growth, but what trajectory it will follow."[24] The Governor, legislators and telecommunications providers are also proposing major telecommunications regulatory reforms. The challenge Minnesota faces is to go beyond the briar patch of managing problems from yesterday, to seize the opportunity created by current changes and uncertainty, and to exercise the leadership on

19. Ziegler, *supra* note 17.
20. *Id.*
21. HENK BRANDS & EVAN T. LEO, THE LAW AND REGULATION OF TELECOMMUNICATIONS CARRIERS 10-11 (1999).
22. Ziegler, *supra* note 17.
23. Shawn Regan, *Return to Basics, Investors Wary of "Themes and Dreams,"* VENTURES, Nov. 2000, at 6.
24. Shelanski, *supra* note 16, at 731.

which our future depends.

IV. TRADITIONAL TELEPHONE SERVICE AS WE KNOW IT WILL BE TECHNOLOGICALLY OBSOLETE BEFORE IMPLEMENTATION OF THE LOCAL COMPETITION PROVISIONS OF THE 1996 TELECOMMUNICATIONS ACT

The traditional telephone network uses "circuit switching" that employs a continuous, unbroken electronic circuit to complete calls. Internet telephony utilizes "packet switching" to break the messages into small pieces, transporting them across the Internet to be reassembled at the call's destination. Packet switching is more efficient because it does not require the capacity of an open circuit. "By digitizing sounds, compressing them and routing them as packets, the network resources dedicated to each call shrink by almost ninety percent."[25] "Internet Protocol—IP—will be the dominant transport mechanism for ... communications networks for years to come."[26]

Although millions and millions of dollars have been spent on telecommunications regulatory reform, with one of the major purposes being to open traditional local telephone networks to competition, technology appears once again well poised to play the joker. The convergence of computer and communications technology is causing a quantum shift in the electronic means by which telephone calls can and are being transported. The National Telecommunications and Information Administration ("NTIA") reports that as of 2000, approximately 5.7% of Internet users in the United States are using the Internet to make phone calls.[27] Some have even gone so far as to predict that "in four or five years you won't be able to recall the last time you made a phone call, excluding your cell phone. Your chief communication will be via the Internet on forms of exchanges that are other than those we have today."[28]

Coincidentally, in early 2001 one of the major Internet service providers began airing a television commercial advertising voice

25. Thurm, *supra* note 8, at R24.

26. James R. Dukart, *Dennis Fazio—Father of the Internet? Tech Pioneer Helped Get Minnesota Online*, VENTURES, Nov. 2000, at 28; *see generally* Cohen, *supra* note 3, at 144-45.

27. National Telecommunications & Information Administration, *Falling Through the Net: Toward Digital Inclusion*, Online Activities 1998 and 2000, Figure II-15, *at* http://www.ntia.doc.gov/ntiahome/fttn00/chartscontents.html (last visited Jan. 18, 2001) [hereinafter NTIA].

28. Regan, *supra* note 23, at 10.

over Internet. The scene shows a mother entering her teenage daughter's room where the daughter is working at her personal computer. The mother has taken away the daughter's telephone privileges with instructions to complete school homework. Reassured that her daughter is working on the computer, the mother leaves her daughter's room. The girl then resumes her voice conversation with a friend indicating it's nice to have other options when her mother takes away the phone. Competition for voice communications has arrived, but not in the form or from the direction many expected.

But what of the Telecommunications Act of 1996? Wasn't there an intention of Congress that the most sweeping overhaul of the Federal Telecommunications Act of 1934 would bring vibrant competition in local and long-distance markets? Five years after the 1996 Act was signed into law, most of its major objectives are yet to be achieved. Insofar as local competition, as of June 2000 Competitive Local Exchange Carriers (CLECs) were providing merely 6.7% of the lines in service nationwide,[29] and presumably mostly to businesses in dense urban settings. On December 14, 2000, FCC Commissioner Tristani indicated the future of CLECs does not appear bright:

> [T]he stock of 27 of the 35 publicly traded CLECs is priced below $10 a share. Covad recently announced that it is limiting its provision of residential DSL service to line sharing. Last month ICG communications filed for bankruptcy. Some analysts are predicting 50% or more of the CLECs won't survive.[30]

The events leading to the enactment of the 1996 Act and the efforts and skirmishes surrounding its attempted implementation have been thoroughly described.[31] Implementation of the Act has been significantly delayed by a combination of:

(1) Unclear and contradictory statutory language;[32]

(2) FCC positions that industry has perceived as aggressive

29. FCC Commissioner Gloria Tristani, The Enforcement Model: Breaking Through Barriers On The Road to Competition, Address at the PLI Annual Institute on Telecommunications (Dec. 14, 2000), *available at* http://www.fcc.gov/commissioners/tristani/tris_speechframe.html.

30. *Id.*

31. *E.g.*, AT&T Corp. v. Iowa Utils. Bd., 525 U.S. 366, 371-77 (1999); Aimee M. Adler, *Competition in Telephony: Perception or Reality? Current Barriers to the Telecommunications Act of 1996*, 7 J.L. & POL'Y 571, 573-84 (1999).

32. *AT&T Corp.*, 525 U.S. at 377-97.

and excessive;[33]

(3) Jurisdictional issues between the FCC and states;[34]

(4) The "Last Mile" to homes and rural areas is a natural monopoly, and even an Act of Congress cannot change this economic reality;[35]

(5) ILECs' aggressive litigation to protect local loop monopoly as long as possible;[36]

(6) AT&T's efforts to thwart and the FCC's rejections of Bell Operating Companies' (BOC) petitions for entry into in-region long distance markets;[37]

(7) Regulatory processes being slowed or abused by participants;[38]

(8) The Act encouraged BOCs to pursue entry into their in-region long distance market and abandon video/broadband deployment;[39]

(9) The Act had the effect of encouraging mergers to the detriment of possible competition;[40]

(10) U.S. Supreme Court labeling of the 1996 Act as "surpassing strange"[41] and "a model of ambiguity or indeed self-contradiction ... most unfortunate for a piece of legislation that profoundly affects a crucial segment of the economy worth tens of billions of dollars"[42] has emboldened contestants to initiate even more litigation.

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33. Rebecca Beynon, *The FCC's Implementation of the 1996 Act: Agency Litigation Strategies and Delay*, 53 FED. COMM. L.J. 27, 29 (2000).

34. *E.g.*, *AT&T Corp.*, 525 U.S. at 371-75; Kerf & Geradin, *supra* note 18, at 948.

35. Kerf & Geradin, *supra* note 18, at 926.

36. *Id.* at 952.

> Chairman Kennard said that one reason why local phone competition has not developed more quickly was that 'too many of the stakeholders in this debate would rather litigate than compete.' Former Chairman Reed Hundt was even more blunt. Incumbent carriers, he said, rely on lawsuits to 'bolster monopolies and stifle interstate commerce and create years of litigation-induced delay.'

Beynon, *supra* note 33, at 28 (citations omitted).

37. Kerf & Geradin, *supra* note 18, at 953-54, 1011; *see also* BRANDS & LEO, *supra* note 21, at 7.

38. Kerf & Geradin, *supra* note 18, at 962.

39. Leslie Cauley, *Bypassing the Bells: Changing Picture*, WALL ST. J., Sept. 21, 1998, at R14.

40. Adler, *supra* note 31, at 585-600; Cohen, *supra* note 3, at 139-41.

41. *AT&T Corp.*, 525 U.S. at 378-79 n.6.

42. *Id.* at 397.

Before all of the many 1996 Act implementation issues are resolved, a changing technological landscape will have mooted many issues. Additionally, voice grade communication service often will be but one of a larger bundled package of other services including things like video conferencing, entertainment, and Internet. The narrow bandwidth required for IP telephony will mean that many policy and regulatory issues concerning voice grade communication may also become economically irrelevant as this application is offered at low cost or simply an embedded feature in a larger service offering.

V. INVESTING IN "LAST MILE" SOLUTIONS IS PARTICULARLY A MINNESOTA CONCERN

The acceleration of broadband infrastructure to solve the "last mile" bottleneck is an objective that will have significant benefits for Minnesota because the objective compliments workforce and technology strengths existing within the state. In December 2000, a group of business, government and education leaders issued a report to the people of Minnesota entitled "Building a Knowledge Economy for Minnesota's 21st Century."[43] The report recognized the growing predominance of a knowledge economy that places primary value on "the talents of human beings in terms of knowledge, know-how and technology."[44] The report advocated, "a focused knowledge-driven industry cluster strategy that maintains the vitality of existing industries and builds on Minnesota's emerging industry clusters, especially those in ... Communications and Information Technology—particularly storage technology and data communications."[45] One need only take a look at the membership list of organizations like the Minnesota High Tech Association to see the strength and potential for even more healthy economic activity in this industry cluster area.[46]

Examples of Minnesota businesses directly involved in this emerging industry sector abound. ADC Telecommunications, a

43. WORKING GROUP ON MINNESOTA'S ECONOMY, BUILDING A KNOWLEDGE ECONOMY FOR MINNESOTA'S 21ST CENTURY: A REPORT TO THE PEOPLE OF MINNESOTA, at 5-9 (2000), *at* http://www1.umn.edu/summit [hereinafter WORKING GROUP ON MINNESOTA'S ECONOMY].

44. *Id.* at 5.

45. *Id.*

46. *E.g.*, Minnesota High Tech Association, http://www.mhta.org (last visited Feb. 3, 2001).

large company based in Minnesota, is a leading provider of data communications equipment with "last mile" solution possibilities.[47] NextNet, Inc. is developing technology to provide a "last mile" solution that will allow wireless Internet access.[48] Optical Solutions, Inc. is another Minnesota-based company that is taking a leading role in deployment of fiber optics to the "last mile."[49] Northstar Photonics, Inc. is developing fiber optic multiplexing technology that has the potential to expand the capacity of a single fiber optic strand by a factor of 1000.[50] There are many other Minnesota businesses in the emerging communications and information technology sector too numerous to mention here making equally significant technological advancements and economic contribution to a strong Minnesota economy.

Minnesota already counts as two of its strongest assets a well-educated work force well suited for the information age and strong educational institutions aspiring to stay ahead of the curve.[51] Greater Minnesota has recognized, and is also taking steps to capture, the opportunities of tomorrow created by information technology.[52] In the new economy, a "scenic location or the presence of recreational opportunities may itself have value"[53] in attracting and retaining information-age employees.[54] Health care and biosciences are two other emerging industry clusters in Minnesota,[55] and each will need and benefit from strong information infrastruc-

47. *See generally* http://www.adc.com (last visited Feb. 3, 2001).

48. *See generally* http://www.nextnetworks.com (last visited Feb. 3, 2001); *see also* Steve Alexander, *A Battle To High-Speed Access To The Home Is Coming*, STAR TRIB. (MINNEAPOLIS), Nov. 1, 1999, at 1D.

49. *See generally* http://www.opticalsolutions.com (last visited Feb. 3, 2001); *see also* Hecht, *supra* note 9, at 48.

50. Jessica Griffith, *Bridging the Bandwidth Gap*, TWIN CITIES LOCALBUSINESS.COM (Aug. 30, 2000), *at* http://www.localbusiness.com/Story/0,1118,MSP_325153,00.html. One prediction is that by 2010 fiber optic wavelength multiplexing "will provide bandwidth on the order of 1,000 megabits/second." Hecht, *supra* note 9, at 48.

51. MINNESOTA PUBLIC RADIO, *supra* note 4; Emily Leinfuss, *A Tale of Two Cities*, COMPUTERWORLD 73, July 5, 1999, *available at* http://www.computerworld.com.

52. MINN. DEP'T OF ECON. SEC., *Northeast Looks Forward to IT Future–Information Technology: An Opportunity for the Northeast Region*, MINN. EMP. REV. (Apr. 1999), *at* http://www.mnworkforcecenter.org/lmi/review/0499rs.htm.

53. Rowe, *supra* note 2, at 392-93.

54. "Factors such as power supply and broadband wiring are moving higher on the list of criteria for making real estate decisions" for businesses. Beth Mattson-Teig, *Smart Spaces—Fast Growing Companies Fuel Wiring Demands*, VENTURES, Nov. 2000, at 44; *see also* Rowe, *supra* note 2, at 384-85.

55. WORKING GROUP ON MINNESOTA'S ECONOMY, *supra* note 43, at 2.

ture. Is it possible to envision the Mayo Clinic, for example, as the leading global provider of telemedicine services, diagnosing and monitoring patients who are in their homes via broadband fiber optic infrastructure? Minnesota has good reason to timely address and invest in its twenty-first century information infrastructure.

VI. TELECOMMUNICATIONS REGULATORY REFORM AND THE "LAST MILE": FIGHTING FOR SOMETHING WORTH HAVING

The effort necessary to make meaningful reforms to Minnesota's telecommunications laws will be significant. Regulation of this key industry will have significant impacts on the state's citizens, but will in large part be shaped by the regulated entities upon which regulation can have a significant effect on profits.[56] The failings of the 1996 Telecommunications Act demonstrate that complex cures can be worse than the disease, with renowned regulatory economists making pleas for "deregulating the process of deregulation."[57] The effort ought to result in substantial reform and a vision of specific future benefits that include speeding deployment of "last mile" broadband infrastructure.

Unfortunately, broadband infrastructure issues are often ignored altogether or enmeshed in pre-exiting turf battles and then not addressed.[58] Local loop monopolies have a significant investment in legacy infrastructure creating an economic incentive to resist "last mile" fiber optic deployment.[59] While capacity and fiber optics are deployed where competition exists, deployment is not taking place in markets where there is not competition.[60] Even after fourteen years of open competition in Britain, British Telcom still held eighty-six percent of the market for local and long distance calls.[61] The natural monopoly characteristics of the "last

56. Kerf & Geradin, *supra* note 18, at 931-32.

57. T. Hazlett, *Economic and Political Consequences of the 1996 Telecommunications Act*, 50 HASTINGS L.J. 1359, 1394 (1998) (quoting Alfred Kahn, LETTING GO: DEREGULATING THE PROCESS OF DEREGULATION OR KLEPTOCRATS AND THE POLITICAL ECONOMY OF REGULATORY DISINGENUOUSNESS (1998)); *see also* Kerf & Geradin, *supra* note 18, at 962.

58. Rowe, *supra* note 2, at 386.

59. Kerf & Geradin, *supra* note 18, at 926; Thomas E. Weber, *Split Decision–A Debate on the Merits of Freeing Up the Networks*, WALL ST. J., Sept. 21, 1998, at R28.

60. Weber, *supra* note 59, at R28. A fundamental trait of a monopoly is the ability to employ an aging technology and still "be assured an economic profit even without innovation; thus a monopolized market is sometimes associated with sloth and inefficiency." BRANDS & LEO, *supra* note 21, at 16.

61. Gautum Naik, *Continental Shift—Phone Competition is Much More Vigorous in*

mile" to homes and rural areas make it unrealistic to expect that efforts to legislate local competition will result in new competitors lining up to install fiber optic cable to homes and rural areas to compete with an entrenched incumbent.

"There's no question that fiber is the fastest, most reliable, and probably most future-proof pipeline around. But phone companies have struggled for years to figure out a low cost way to deliver it."[62] A few companies are overlaying fiber optics in parallel with copper twisted pair to homes for later use, but that is rare.[63] Most new housing development is proceeding down the same old path with telephone companies installing copper twisted pair wire and cable companies installing copper coaxial cable to homes. Telecommunications reform legislation needs to discourage continued deployment of soon to be obsolete hundred-year-old copper wire to homes and other "last mile" bottleneck locations and encourage future-proof infrastructure.

Minnesota legislation to speed deployment of broadband infrastructure is both needed and consistent with federal law. Section 706 of the 1996 Telecommunications Act specifically provides:

> [E]ach State commission with regulatory authority over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans ... by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment.[64]

A resolution by the National Association of Regulatory Utility Commissioners indicated that Section 706 "is an invitation to 'grab the brass ring' of new technology and should not be used simply as an opportunity to pick the low level fruit."[65]

A particular challenge to drafting state legislation to accom-

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Europe than in the U.S. There are Lessons in That, WALL ST. J., Sept. 21, 1998, at R26.

62. Hecht, *supra* note 9.

63. *Id.* at 51.

64. Telecommunications Act of 1996, Pub. L. No. 104-104, § 706, 110 Stat. 153 (Telecommunications Act codified at 104 U.S.C. §§ 251-61, 271-76).

65. Rowe, *supra* note 2, at 382 (citing NARUC, *Resolution Regarding Petitions to the FCC for Action Under Section 706, available at* http://www.naruc.org/Resolutions/winter98.htm).

plish "last mile" telecommunications infrastructure development is reconciling the economic reality of continuing natural monopoly characteristics in a large portion of "last mile" local loop with the 1996 Act's requirement that no state "prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service."[66]

Justice Breyer of the Supreme Court stated, "To what extent is local competition possible without wasteful duplication of facilities? The Act does not purport to answer this question. Rather, it creates a set of legal rules which, through interaction with the marketplace, aims to produce sensible answers."[67]

A combination of incentives for deployment of fiber optic infrastructure in new developments and to speed replacement of old copper-based infrastructure already in place appears possible and consistent with the overall intent and wording of the Act. Indeed, Minnesota has already embarked upon the "the kind of 'experimentation' long thought a strength of our federal system"[68] in entering into a public-private initiative to lay fiber optic trunks along Minnesota freeways called "Connecting Minnesota."[69] This project was terminated recently but survived a court challenge in Minnesota District Court[70] and requests for the FCC to rule the project preempted and forbidden as anti-competitive.[71]

Tax incentives and investment credits may be one way to easily encourage deployment of fiber optic cable in new developments. Tax disparities in the taxation of telecommunication service providers is a current issue that will be presented to the legislature. This creates a ready opportunity to advance Minnesota's telecommunications infrastructure future at the same time.

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66. 47 U.S.C. § 253(a)(2000).

67. *AT&T Corp.*, 525 U.S. at 416.

68. *Id.* at 418.

69. MINN. DEP'T OF TRANSP., *Connecting Minnesota, at* http://www.dot.state.mn.us/connect (last visited Feb. 3, 2001).

70. Minn. District Court Findings of Fact/Conclusions of Law/Order & Mem., *Minn. Equal Access Network Sys. Inc. v. State* (May 4, 1999). The author attempted to download this court decision from the state's website using a 56k modem and waiting fifteen minutes, yet another reminder of the shortcomings of copper twisted pair data communications.

71. In the Matter of the Petition of the State of Minnesota for a Declaratory Ruling Regarding the Effect of Section 253 on an Agreement to Install Fiber Optic Wholesale Transport Capacity in State Freeway Rights-of-Way, CC Docket No. 98-1, Memorandum and Order at 64-65 (Dec. 23, 1999), *at* http://www.fcc.gov/Bureaus/Common_Carrier/Orders/1999/fcc99402.txt.

Mechanisms and incentives to replace existing infrastructure may be more difficult. One possibility would be to design legislation allowing and encouraging "last mile" infrastructure joint ventures. The capital investment necessary to deploy fiber optics would be borne by the joint venture partners. The cost of the installation of broadband fiber to the home in a shared environment could be less than the cost, for example, of individual upgrades needed to achieve lesser DSL or cable modem speeds over existing copper.[72]

If power companies, who are mostly staying on the sidelines of local competition because of infrastructure expense and regulatory uncertainty,[73] participated in the joint venture, substantial capital savings could be achieved. Moreover, the fiber optic infrastructure put in place will be far superior to copper and have sufficient bandwidth to support vigorous competition for applications and services by multiple providers.

"Last mile" joint ventures would need to be structured on an open participation basis. This could be done applying well-known antitrust principles regarding essential facilities and Federal Trade Commission guidelines on joint ventures among competitors.[74] The existence of, participation in, or non-participation in a "last mile" joint venture would not prohibit any competitor from deploying their own alternative telecommunications network should they desire.

In a world of fast-changing technology, fewer rules and rules of broader application are often better suited to deal with change.[75] There may be other equally worthy ways of achieving the acceleration of telecommunications infrastructure within the state. All worthy proposals merit consideration in charting the course of something as important as the telecommunications infrastructure backbone for Minnesota's economy in the twenty-first century.[76]

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72. *Supra* note 11 and accompanying text.

73. Bill Richards, *Power Play—Utility Companies are the Dark Horse in the Telecommunications Race*, WALL ST. J., Sept. 21, 1998, at R21.

74. FED. TRADE COMM'N & U.S. DEP'T OF JUSTICE, ANTITRUST GUIDELINES FOR COLLABORATIONS AMONG COMPETITORS (2000).

75. Kerf & Geradin, *supra* note 18, at 958-60, 983-84.; Dukart, *supra* note 26, at 28.

76. Use of cooperatives or a Rural Electrification Act model, for example, might also have useful aspects. *See generally* Lindenberg, *supra* note 1, at 41. Minnesota Statutes section 308A.210 authorizes telecommunications services purchasing cooperatives. MINN. STAT. § 308A.210 (2000). Another creative effort in this direction is found in Minnesota Statutes section 116J.037, which provides for the

The most important thing is that deployment of modern fiber optic telecommunications infrastructure receive consideration because it is truly one aspect of regulatory reform with the potential for tremendous positive statewide impacts.

VII. CONCLUSION

In a hearing before the Minnesota legislature several years ago concerning telecommunications regulatory reforms, the following comments were presented. In every regulatory reform debate in recent years, telecommunications providers laud the benefits of competition and their desire to see more of it. When it comes to their particular turf, in more instances than not however, a listener would think the conversation had turned to the storage of spent nuclear fuel rods: "Not now, not here, not in my backyard." Years have passed and local competition is barely visible, let alone consideration of major "last mile" infrastructure upgrades to homes.

In the meantime, technology continues to drive the changes fueling the need for infrastructure improvements. Internet usage continues to grow.[77] Between 1998 and 2000, the fastest growing uses for Internet users in the U.S. were (1) to shop and pay bills and (2) communication.[78] A recent NTIA report indicates that slightly over eighty percent of United States Internet users use the Internet from home and about twenty percent outside the home.[79] The City of Chicago has announced plans to build "the most ambitious public-private fiber optic network in the United States" to be installed in every street in Chicago and available for government, business and residential use.[80] Progress is possible with leadership and clear direction.

A Minnesota court recently recognized the significance of fiber optic technology and the magnitude of its potential for the well being of the state by stating: "[f]iber optic cables are to our future as telephone lines were to our past. The State of Minnesota, its private citizens, and its business entities need to have telecommunica-

certification of e-commerce ready cities and counties. MINN. STAT. § 116J.037 (2000). The author believes Section 116J.037 should be amended to provide for road signs recognizing e-commerce ready certification as was provided in the Minnesota Star Cities program upon which Minn. Stat. § 116J.037 was patterned.

77. NTIA, *supra* note 27, at Box II-1.

78. *Id.* at Figure II-15.

79. NTIA, *supra* note 27, at Box II-1.

80. Tony Kontzer, *Chicago's CivicNet Takes Step Closer to Reality*, INFO. WK., Jan. 4, 2001, *at* http://www.informationweek.com/story/IWK20010104S0007.

tions services to succeed in the twenty-first century."[81]

Effective leadership in a climate of fast technological change and increasing Internet dependence requires decision-makers to "embrace speed and be flexible."[82] The time is now for "Last Mile" leadership. The time is now to lead Minnesota to swifter modernization of telecommunications infrastructure to homes and rural areas.

81. Minn. District Court Mem. at 1, *Minn. Equal Access Network Sys. Inc., v. State* (May 4, 1999).

82. Dukart, *supra* note 26, at 28.